

GEOLOGY AND GEOGRAPHY

Chairman: PRESTON MCGRAIN, Indiana Flood Control
and Water Commission

O. P. Starkey, Indiana University, was elected chairman for 1950.

ABSTRACTS

Topographic Mapping in Indiana. C. H. BECHERT, Division of Water Resources, Indiana Department of Conservation.—The first topographic maps of quadrangles in Indiana were issued early in the 1900's. They were of areas in the southwestern part of the State, that section being selected because of the coal deposits. The scale was 1 to 62,500. About 20 maps of this type were published of areas wholly or in part within Indiana. The later maps are on a scale of 1 to 24,000, comprise about 57 square miles each and have 20 or 10-foot contours except in a few areas where 5-foot contours are used. Within the last few years more uniform progress is being made in the mapping program and to date approximately a fourth of the state has been mapped. This has been accomplished by an annual appropriation by the State Legislature of \$50,000 which amount is matched by Federal funds. The maps are obtainable from the Division of Water Resources and as many as 300 have been distributed in one month. They are used extensively by oil and gas operators, water well drillers, coal producers, contractors, utilities, and sportsmen.

Florida Pebble Phosphate. ARTHUR B. CARR, Indianapolis.—Sketch of the geologic origin of the great Land Pebble Phosphate of Lime deposits of Florida, which state is producing three fourths of the nation's output of fertilizer, with conservatively estimated six billion tons of ore in sight, and an unbelievable reserve, sufficient at present production to last eight thousand years.

A dramatic picture of a vast, ancient land and marine animal life in Florida, the phosphatized bones of which are daily being taken from the mines.

Also, very briefly, the story of the intricate process employed by ten great plants in one area, in converting the mined pebbles into soluble plant-food for world consumption, the yearly output of one mine alone being one and a half million tons.

"The world must be fed, and phosphate fertilizer seems the answer, if wasted lands are to be restored, that world peoples are to survive."

Secondary Recovery by Water Pressure in the Casey (Illinois) Oil Field. ROBERT R. DRUMMOND and LAMONT DEHL, Indiana State Teachers College.—For some years various experimental processes of secondary recovery of crude oil have been carried on by a number of companies. This paper concerns itself with a very successful operation in a “nearly exhausted” field located near Casey, Illinois.

Late in 1946 the Forest Oil Company of Pennsylvania began an attempt to adapt methods found successful in Pennsylvania to the old Casey Pool. Earlier attempts at pressurizing with air had proved only moderately successful and were, subsequently, abandoned. The new operation began the first local use of water pressurizing with the “Five Spot” method.

Success over the last two years has truly been spectacular and, as a result, an old field has taken on a new lease on life.

The Ohio Oil Company has watched this small operation with more than usual interest and much portends for this successful method.

Collecting and Utilizing Water Well Records. T. M. KINGSBURY, Division of Water Resources, Indiana Department of Conservation.—About three years ago the Division of Water Resources solicited the members of the Indiana Water Well Drillers Assn. at its annual meeting to cooperate in the collection of ground water information in Indiana by supplying well records, pumping tests, water level measurements and other pertinent data. It was explained that the purpose was to learn more about the State’s ground water resources, the areas and formations which were water bearing, the quantities of water that were available, etc. To promote this project the Division published pocket-sized booklets containing about 100 well record forms in alternate white and yellow sheets. These were distributed among drillers who were asked to return the well records on the white sheets and keep the yellow sheets in the book for their own use. Last year the Division collected more than 1200 well records through voluntary cooperation. There are no state laws, as in the case of oil or gas wells, requiring drillers to furnish the Department with logs of wells. These logs have added materially to the fund of information on subsurface conditions, with emphasis on one of our most important resources—water. From them more is being learned about thickness of glacial drift in areas not drilled for oil or gas and about preglacial erosion.

A Giant Earth Mover. G. DAVID KOCH, Indiana State Teachers College.—At their Chieftain Mine, No. 20, about four miles south of Riley, Indiana, Maumee Collieries have in operation one of the largest draglines in the world. This huge earth mover has a boom 215 feet long and swings a bucket with a 25 cubic yard capacity. The boom, which extends into space at a 42 degree angle, can dig 120 feet below ground level and dump earth about 60 feet above that level.

The dragline is used exclusively for removing an overburden that averages 57 feet, 7 inches thick and consists of clay, gravelly clay,

limestone and slate. The coal seam, which is being exposed, averages 5 feet, 1 inch in thickness.

The Swallow-holes of Lost River, Orange County, Indiana. CLYDE A. MALOTT, Indiana University.—Approximately 45 square miles of the area of the upper part of the Lost River system has a normal surface drainage down a gentle westerly sloping limestone upland. The gathered stream waters from this area discharge onto a sinkhole plain and are absorbed in numerous small and several large swallow-holes developed in and near the stream channel. The underground stream formed by these sinking waters runs through cavernous routes for a distance of 8 miles, while a surface dry-bed channel, only infrequently flooded by excessive stormwaters, meanders about on its way across the sinkhole plain for a distance greater than 20 miles. The dry-bed with its swallow-holes in its upper section and its resurgences at its lower end is mapped and its features described in some detail. Special attention is given to the large Tolliver swallow-hole which may be entered and its route followed to underground Lost River which here is 75 to 80 feet below the upland sinkhole plain.

The development of the extensive sinkhole plain and the swallow-holes in the dry-bed channel has been dependent upon a lowering of the watertable below the level of the upland and the dry-bed channel. Upstream from the dry-bed on the same upland limestone plain the watertable is close beneath the surface and the stream beds which form the headwater section of Lost River. Little or no subterranean drainage is developed throughout the 45 square miles of the area. In the region of the sinkholes and the swallow-holes of the dry-bed the watertable has withdrawn far below the upland plain and the river channel, and the surface and stream waters go below and form a great underground drainage system. In the lower section of the dry-bed channel and at its terminus the valley of Lost River is deeply intrenched and its channel approaches and reaches the watertable. Here the resurgences occur and normal surface drainage is restored.

Preliminary Report on the Thickness of Glacial Drift in the Upper Wabash Drainage Basin. PRESTON MCGRAIN, Indiana Flood Control and Water Resources Commission.¹—Great variations in thicknesses of glacial drift have been noted in the upper Wabash Basin area. These variations are due to a large extent to the presence of a former major drainage system which is now buried and hidden from view. The presence of morainic masses and the depth of stream dissection are other important factors affecting the variability in thickness. Thicknesses from nothing to more than 450 feet have been encountered.

This study was a part of flood control investigations and surveys along the upper Wabash River and its major tributaries. It was prompted by the need of determining the strength, stability, porosity, and permeability of the earth materials at possible dam sites, the effectiveness and water-tightness of resulting reservoirs, and the geo-

¹ Published by permission of the Chief Engineer, Indiana Flood Control and Water Resources Commission.

logical conditions in the watershed areas. This geological survey covered parts of 26 counties. In addition to personal observations the logs of more than 3500 wells were collected and studied. These records are on file in the offices of the Indiana Flood Control and Water Resources Commission in Indianapolis.

The trunk stream of the buried drainage system is the Teays (Kanawha). The valley of this stream occupied a sinuous course across Adams, Jay, Blackford, Grant, Wabash, Miami, Cass, White, Carroll, Tippecanoe, Warren, and Benton counties in Indiana. Other buried valleys which were tributaries to the Teays (Kanawha) were located. Some of the latter can be traced for tens of miles. Tributary valleys are noticeably more narrow than the main valley.

Nearly flat or gently rolling limestone uplands characterize most of the inter-valley areas. Pennsylvanian and Mississippian sandstones, and Mississippian and Devonian shales cap the bedrock sequence in the western part of the area studied.

A variety of materials fill the buried channels. However, it may be said that where the former stream flows in a southerly direction coarse sands and gravels are generally present in quantities. Where north flowing, the valleys are generally filled with fine-grained sediments.

Character of Sand in the Ohio River Formation, JOHN B. PATTON, Division of Geology, Indiana Department of Conservation.—The Ohio River formation (Tertiary, Pliocene?) occurs in Clark, Floyd, Washington, and Harrison counties, Indiana, and is composed of poorly consolidated sandstone and conglomerate. Sand from the formation was formerly used for manufacturing glass, and a little is still used in finishing plaster. An increasing interest in sources of high-silica material accentuates the need for quantitative information on all such deposits. Chemical, spectrographic, and sieve analyses of samples from the most recently opened pit in the Ohio River formation are presented.

Regional Influences upon the Canadian Railway Pattern, WILLETT RHYNSBURGER, Indiana University.—The railways of Canada, in contrast to the situation in the United States, are of pre-eminent significance to the national economy. This paper briefly examines the patterns of railway routes in the settled part of Canada in terms of the major physiographic realms. A threefold classification of regional transport functions is suggested: (1) the drawing-off of the commodities of primary surplus production; (2) the carriage of goods over long distances of unproductive territory; (3) the assembling and interchange of goods at the great manufacturing and marketing centers.

In the Cordillera and on the Shield, each with only about 3 miles of line per 100 square miles of area, the railways perform primarily a transit function. In the Prairie Provinces and in the Maritimes, with about 7 miles of line per 100 square miles, the drawing-off of surplus production is the principal railway function. In the metropolitan region of Canada, the St. Lawrence Lowland, which has almost 15 miles of railway line per 100 square miles, the terminal function equals in importance the moving of surplus production.